

In the Claims

1 (original). A polynucleotide comprising a polynucleotide sequence encoding a mutant small subunit of a heat labile plant ADP glucose pyrophosphorylase (AGP) enzyme, or a fragment thereof, wherein said small subunit comprises a mutation in the N-terminal portion thereof, and wherein when said mutant small subunit is expressed with a large subunit of a plant AGP enzyme to form a mutant enzyme, said mutant enzyme exhibits increased heat stability relative to a wild type AGP enzyme.

2 (original). The polynucleotide according to claim 1, wherein said mutant small subunit is a maize AGP subunit.

3 (original). The polynucleotide according to claim 2, wherein said mutant small subunit is a maize endosperm AGP small subunit comprising an amino acid mutation wherein the tyrosine amino acid at position 36 of the wild type maize endosperm AGP small subunit sequence is replaced with an amino acid that confers said increased heat stability on said mutant enzyme.

4 (original). The polynucleotide according to claim 3, wherein said tyrosine is replaced by a cysteine.

5 (original). The polynucleotide according to claim 4, wherein said mutant small subunit comprises the amino acid sequence shown in SEQ ID NO:4.

6 (original). The polynucleotide according to claim 5, wherein said polynucleotide comprises the nucleotide sequence shown in SEQ ID NO:3.

7 (original). The polynucleotide according to claim 3, wherein said mutant small subunit comprises a further mutation wherein an amino acid is inserted between the serine amino acid at position 34 and the threonine amino acid at position 35 of the wild type maize endosperm AGP small subunit sequence.

8 (original). The polynucleotide according to claim 7, wherein said tyrosine is replaced by a cysteine.

9 (original). The polynucleotide according to claim 7, wherein the inserted amino acid is a glutamine.

10 (original). The polynucleotide to claim 8, wherein the inserted amino acid is a glutamine.

11 (original). The polynucleotide according to claim 10, wherein said mutant small subunit comprises the amino acid sequence shown in SEQ ID NO:8.

12 (original). The polynucleotide according to claim 11, wherein said polynucleotide comprises the nucleotide sequence shown in SEQ ID NO:7.

13 (original). The polynucleotide according to claim 7, wherein the inserted amino acid is a glutamic acid.

14 (original). The polynucleotide according to claim 8, wherein the inserted amino acid is a glutamic acid.

15 (original). The polynucleotide according to claim 14, wherein said mutant small subunit comprises the amino acid sequence shown in SEQ ID NO:10.

16 (original). The polynucleotide according to claim 15, wherein said polynucleotide comprises the nucleotide sequence shown in SEQ ID NO:9.

17 (currently amended). The polynucleotide according to ~~any preceding claim~~ claim 1, wherein said polynucleotide comprises a polynucleotide sequence encoding a large subunit of a plant AGP enzyme.

18 (currently amended). The polynucleotide according to claim 17, wherein said large subunit comprises a mutation that confers increased heat stability on an AGP enzyme or increased individual seed weight on a plant that comprises said large subunit.

19 (original). The polynucleotide according to claim 18, wherein said large subunit comprises a heat stability (*HS*) mutation selected from the group consisting of *HS13*, *HS14*, *HS16*, *HS33*, *HS40*, *HS47*, *HS RTS 48-2*, *HS RTS 60-1*, *HS33F*, *HS33M*, *HS7+3*, *HS6+3*, *HS7+6*, and *HS7+6+3*.

20 (currently amended). A method for increasing resistance of a plant to heat stress conditions, said method comprising incorporating the polynucleotide of ~~any preceding claim 1~~ into the genome of a plant and expressing the protein-mutant small subunit AGP enzyme encoded by said polynucleotide, thereby increasing resistance of the plant to heat stress conditions.

21 (original). The method according to claim 20, wherein said plant is a monocotyledonous plant.

22 (original). The method according to claim 21, wherein said monocotyledonous plant is selected from the group consisting of rice, wheat, barley, oats, sorghum, maize, lily, and millet.

23 (original). The method according to claim 20, wherein said plant is *Zea mays*.

24 (original). The method according to claim 20, wherein said plant is a dicotyledonous plant.

25 (original). The method according to claim 24, wherein said dicotyledonous plant is selected from the group consisting of pea, alfalfa, chickpea, chicory, clover, kale, lentil, soybean, tobacco, potato, sweet potato, radish, cabbage, rape, apple tree, and lettuce.

26 (currently amended). The method according to claim 20, wherein said plant comprises or expresses a large subunit of a plant AGP enzyme, wherein said large subunit comprises an amino acid mutation that confers increased heat stability or increased individual seed weight to a plant comprising or expressing said large subunit.

27-30 (canceled).

31 (currently amended). A plant, ~~or~~ plant tissue or cell comprising the polynucleotide molecule of ~~any of claims 1-19~~ claim 1.

32 (currently amended). The plant, ~~or~~ plant tissue or cell according to claim 31, wherein said plant, ~~or~~ plant tissue or cell is monocotyledonous.

33 (currently amended). The plant, ~~or~~ plant tissue or cell according to claim 32, wherein said monocotyledonous plant, ~~or~~ plant tissue or cell is selected from the group consisting of rice, wheat, barley, oats, sorghum, maize, lily, and millet.

34 (currently amended). The plant, ~~or~~ plant tissue or cell according to claim 31, wherein said plant is *Zea mays* or said plant tissue or cell is from *Zea mays*.

35 (currently amended). The plant, or plant tissue or cell according to claim 31, wherein said plant, or plant tissue or cell is dicotyledonous.

36 (currently amended). The plant, or plant tissue or cell according to claim 35, wherein said dicotyledonous plant, or plant tissue or cell is selected from the group consisting of pea, alfalfa, chickpea, chicory, clover, kale, lentil, soybean, tobacco, potato, sweet potato, radish, cabbage, rape, apple tree, and lettuce.

37 (currently amended). The plant, or plant tissue or cell according to claim 31, wherein said plant tissue is a seed.

38 (currently amended). The plant, or plant tissue or cell according to claim 31, wherein said plant, plant tissue or cell comprises or expresses a large subunit of a plant AGP enzyme, wherein said large subunit comprises an amino acid mutation that confers increased heat stability or increased individual seed weight to a plant comprising or expressing said large subunit.

39-42 (canceled).

43 (currently amended). A composition comprising:

- i) a polynucleotide as defined in ~~any of claims 1-16~~ claim 1; and
- ii) a polynucleotide comprising a polynucleotide sequence that encodes a large subunit of a plant AGP enzyme.

44 (currently amended). The composition according to claim 43, wherein said large subunit comprises a mutation that confers increased heat stability on an AGP enzyme or increased individual seed weight on a plant that comprises said large subunit.

45 (original). The composition according to claim 44, wherein said large subunit comprises a heat stability (HS) mutation selected from the group consisting of HS13, HS14, HS16, HS33, HS40, HS47, HS RTS 48-2, HS RTS 60-1, HS33F, HS33M, HS7+3, HS6+3, HS7+6, and HS7+6+3.

46-59 (canceled).

60 (currently amended). A method for preparing a plant having an AGP enzyme that exhibits increased stability relative to a wild type AGP enzyme said method comprising introducing a polynucleotide as defined in ~~any of claims 1-19~~ claim 1 into a plant cell and growing a plant from said plant cell; or breeding a plant comprising a polynucleotide as defined in claim 1 with another plant of the same species and obtaining progeny that comprise said polynucleotide.

61 (original). The method according to claim 60, wherein said plant grown from said plant cell is selected for expression of said polynucleotide.

62 (original). The method according to claim 60, wherein said plant is a monocotyledonous plant.

63 (original). The method according to claim 22, wherein said monocotyledonous plant is selected from the group consisting of rice, wheat, barley, oats, sorghum, maize, lily, and millet.

64 (original). The method according to claim 60, wherein said plant is *Zea mays*.

65 (original). The method according to claim 60, wherein said plant is a dicotyledonous plant.

66 (original). The method according to claim 65, wherein said dicotyledonous plant is selected from the group consisting of pea, alfalfa, chickpea, chicory, clover, kale, lentil, soybean, tobacco, potato, sweet potato, radish, cabbage, rape, apple tree, and lettuce.

67 (currently amended). The method according to claim 60, wherein said plant comprises or expresses a large subunit of a plant AGP enzyme, wherein said large subunit comprises an amino acid mutation that confers increased heat stability or increased individual seed weight to a plant comprising or expressing said large subunit.

68-71 (canceled).

72 (currently amended). An expression construct comprising a polynucleotide as defined in ~~any of claims 1-19~~claim 1.

73-85 (canceled).

86 (new). A protein comprising a polypeptide encoded by a polynucleotide as defined in claim 1.